grows on conifers! In this group we also find *Geopyxis* Persoon (emended) Myc. Eur. i. p. 224 (not p. 42, according to both Saccardo and Mr. Massee): Persoon did not make *Geopyxis* a genus, although Saccardo also credits him with having done so; he published it as a division of *Peziza*, and Saccardo is the first who made it a genus, and therefore it ought to be *Geopyxis* Sacc. One of the species is the beautiful *Peziza coccinea* of old authors, transferred by Phillips to *Lachnea*, by Saccardo to *Sarcoscypha*, and now by Mr. Massee to *Geopyxis*. The division of the *Carnosæ* includes the genera *Peziza*, *Otidea*, *Humaria*, and others. A new genus, *Curreyella*, has been made to include *Peziza radula* and *P. trachycarpa*. Are we to assume that the Cuban species *Massea quisquiliarum* grows also in Britain?

In the family of the *Helvelleæ* there is much less alteration and rearrangement; but even there, two genera have been retained that were considered unnecessary by Phillips and Saccardo: *Cudonia* Fr., to contain *Leotia circinans*, which differs from others of the genus in the possession of filiform spores, and *Mitrophora* Lév., in which are placed two species of *Morchella*, *M. gigas* and *M. semilibera*. In these the lower half of the pileus is free from the stalk.

The numerous changes, however much we regret them, testify to the care with which Mr. Massee has treated the subject. He has omitted to mention one point of considerable morphological interest: that the abnormal many-spored condition of the ascus in *Tympanis* is due to budding of the original eight spores in the ascus.

The classified list of fungi, issued by Dr. McAlpine, has been compiled to assist vegetable pathologists in determining the diseases of plants due to these organisms. The knowledge of Australian fungi is as yet very incomplete, and we may expect the list to be largely augmented. M. C. Cooke's "Handbook of Australian Fungi" has served as a basis for the present work, and to it have been added the genera and species recorded by the more recent collectors and workers in this branch of botany. Australia possesses such a unique flora of the phanerogams, that we should have liked some indication of the fungi that belong exclusively to that country. The author has mainly followed the method of classification which has been adopted by Saccardo in his "Sylloge Fungorum." Dr. McAlpine retains the *Hyphomycetes* as a class by themselves, but describes them as imperfect *Ascomycetes;* this is hardly correct, for though many of them have been proved to be form-genera, others are unrelated so far as is yet known.

Besides giving us a list of fungi, Dr. McAlpine has drawn up some very instructive tables. The number of fungi recorded varies very much from colony to colony. Victoria heads the list with 1070 species, though we suspect this position of pre-eminence is due to the presence of Baron von Mueller, rather than to the abundance of fungi. Queensland records 1060 species, a large percentage of the whole due to the labours of an indefatigable worker, Mr. F. M. Bailey. Brisbane has 739 species, and New South Wales lags far behind with 406. There is much work evidently to be done before the localities are all worked out. The total number for Australia and Tasmania is 2294, as compared with 5040 recorded for Britain. The total number of species known to science is somewhere about 40,000. Dr. McAlpine has also prepared a host-index, which presents many points of interest. On *Casuarina*, that peculiar Australian tree, we find *Fomes igniarius*, a cosmopolitan species. *Eucalyptus* seems specially afflicted—leaves, bark, branches and trunk have all their separate fungal parasites. The *Compositæ* are hosts to but two, an *Æcidium* and a *Synchytrium*, evidently an incomplete account.

The *Agaricineæ* and *Polyporeæ* have received a much larger share of attention than the more minute forms of the *Discomycetes* and the *Pyrenomycetes;* Australian collectors give an account of but five *Nectrias* and two *Valsas*, but these forms are very easily overlooked. The *Phycomycetes* are also very sparingly represented; there are two *Peronosporas*, one on tobacco-leaves, the other on the onion. There is no record of potato disease, nor of salmon disease; we can only congratulate the colony on its immunity.

In addition to the authority and date for each fungus, Dr. McAlpine gives the locality in Australia, the habitat and a description in English of the species, but in no case does he indicate the characters of the genus; the list thus strikes the reader as being very imperfect, and the absence of all information as to the size of the particular plants renders it less useful than it might otherwise have been. We think he has vainly spent his strength in his attempt to provide an English equivalent for the scientific name of each fungus. Popular specific names have not been given even to flowering plants, such as the different kinds of *Myosotis* or *Crepis*, and such names are equally valueless in the case of fungi.

Dr. McAlpine has recently published, in "Guides to Growers," a most useful and practical account of the disease of onions caused by eelworms, with the best methods of cure. The worms live in the soil, and various dressings are recommended, suitable rotation of crops, or burning the surface of the land. This particular eelworm attacks the stems of plants, and in the case of the onion destroys the bulbs, leaving the roots unharmed.

A. L. S.

OUR BOOK SHELF.

The Climates of the Geological Past, and their Relation to the Evolution of the Sun. By Eug. Dubois. (London: Swan Sonnenschein and Co., 1895.)

THE first part of this essay consists of a brief and judicious summary of the geological evidence as to great changes of climate in past ages, while the second part is an attempt to explain the causes of such variations. Various well-known theories have been advanced to account for the phenomena, but none have met with general acceptance; a few years ago Dr. Neumayr wrote: "Most plausible and simple would it certainly be were the sun a variable star that at different periods emits different quantities of heat; but for this no proof is forthcoming." (NATURE, vol. xlii. p. 180.) The author of the present work seems to have adopted Dr. Neumayr's suggestion, but goes further and attempts to show that the postulated changes of solar radiation have actually taken place. In a general way, the fact that the sun must once have been hotter, has been frequently stated as a possible cause of the higher temperatures during early geological times, but a gradual cooling of the sun is insufficient to explain all the vicissitudes of geological climates. Basing his estimate on the relative proportions of stars of different spectroscopic types, the author considers that the sun has

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passed about three-fifths of its star life, and that we cannot be far wrong in assuming for the past a maximum duration of about ten million years, and a radiation in the white-star stage twice as intense as at present. As a step towards the reconciliation of the life assigned to the sun by physicists and that demanded by geologists, it is suggested that in consequence of the higher temperature when the sun was a white star, denudation was carried on more vigorously, and animal and vegetable life developed more rapidly than has been supposed.

Notwithstanding that the author has approached the subject with an enlightened mind, he does not appear to have greatly advanced the explanation. For the production of changes other than those due to the progressive cooling of the sun, it is necessary to suppose that the sun is subject to periodical changes, and the chief argument brought forward in favour of this supposition is that the acknowledged eleven-yearly period of the sun renders it probable that there may also be periods of longer duration.

It is clear that such long-period changes are quite outside our range of observation, and the indirect evidence brought forward is unconvincing. We do know, however, that the variation which has been observed in stars resembling the sun is very rare and always slight.

Methodisches Lehrbuch der Elementar-Mathematik. Von Dr. Gustav Holzmüller. (Leipzig: Teubner, 1894–5.)

THIS is a text-book of elementary mathematics, showing the extent of knowledge required of the German schoolboy; and apart from the interesting presentation of the subjects in a manner far superior to anything we can show, the book is well worthy of translation as illustrating the difference in the standards of requirement of German and English schools; the knowledge exacted of the German schoolboy being about the equivalent of our B.A. requirements.

But then the German schoolmaster, although working to a much higher standard, can take his responsibilities lightly; he has merely to point out to his pupils that it depends entirely upon themselves whether they are to spend three years or only one under the civilising influence of the drill-sergeant.

The harder his pupils work, to escape with one year of military service, the higher the standard which the government inspector can exact for exemption; thus the paradoxical result is attained that the system of conscription tends ultimately to elevate the intellectual standard of school knowledge; but, on the other hand, the physical development of youth runs great risk of being stunted. Obviously there is no place in a German school, or French school either now, for the cricket, rowing, and football, which we now consider of equal importance with abstract studies. All Europe is now an armed camp, this country excepted; and the observant philosopher is doubtless beginning to draw inferences as to the comparative effect of the systems on the development of the human race.

Dr. Holzmüller's "Einführung in die Theorie der isozonalen Verwandschaften und der Conformen Abbildungen," 1882, is a well-known standard work, profusely illustrated with carefully-drawn diagrams, which emphasise many delicate points in the Theory of Functions in a manner much more convincing than arguments depending on a procession of analytical formulas; so also in this "Methodisches Lehrbuch," a plentiful supply of figures serves as a substitute for long algebraical calculations.

The author has made these elementary parts of mathematics more interesting and pleasant reading by historical notes and simple applications; and altogether the work is a great contrast to the dry bones we are accustomed to here; it would be well for our writers of school books to study the sentiment expressed in Dr. Holzmüller's preface: "Uns von der allzustarren Gebundenheit der Lehrpläne zu befreien." G.

LETTERS TO THE EDITOR.

[*The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts intended for this or any other part of* NATURE. *No notice is taken of anonymous communications.*]

Heights of August Meteors.

IN addition to the four or five meteors recorded last week in NATURE (vol. lii. p. 395–6), by Mr. Denning, as having been simultaneously observed at more than one station during this year's August-meteor period, particulars which have just now reached me of some observations of the Perseïds made at Tring, in Herts, on the night of the 11th inst., show that two of the meteors seen and mapped here between 9.45 and 12 P.M. on that night, also had their apparent paths mapped simultaneously at a place at Tring, about nineteen miles due north from this point of observation. The base-line between the two stations is a rather short one for such comparative determinations, but as the recorded flights passed nearly overhead, and nearly from east to west across the line between the stations, the conditions for accuracy were very favourable in both the meteors' cases, and the apparent paths seem also, by the comparison, to have been mapped with much precision. They require, however, as usual, corrections of a few degrees at the beginning and end points to make them quite geometrically compatible.

Tring.—August 11, 9.53 P.M.; 1st magn.; left a long streak along a long path; 33°, from 332½ + 39 to 287½ + 42½; (corrected path, 35°, from 328 + 40 to 280 + 41). Duration, 2 or 3 seconds.

Slough.—August 11, 9.53 P.M.; 1st magn., white; 37° in 1·2 second, from 331 + 53 to 268 + 51; (corrected path, 35°, from 336 + 50½ to 277 + 54). Left a bright white streak on its whole course for 3 seconds.

The observed tracks are 15° to 13° apart, nearly parallel, but slightly converging; and if made parallel, about 14° apart throughout, they indicate a radiant-point at the east-horizon (11° N. from E.), at 21 + 7, near μ and o Piscium, from very near which radiant-point the meteor was, no doubt, directed, as its long streak-leaving flight plainly enough denoted a very nearly horizontal motion. The resulting real path is from 77 miles over a point 4 miles north of Farringdon, in Oxfordshire, to 77 miles over a spot 3 miles E.N.E. from Uxbridge, in Middlesex. This course of 50 miles, with a duration of 1·2 seconds, gives the speed of flight 41⅔ miles per second, the speed for meteors with parabolic motion from the same radiant-point (omitting a small addition for the earth's attraction) being 40¾ miles per second. In Mr. Greg's "General Comparative Table of Radiant Positions," as No. 106 of the list ("British Association Report," 1874, p. 333), a place at 22 + 5 is given as the average radiant-centre of a group of several meteor showers observed by Schmidt, in Athens (p. 321–2 of the same "Report"), in July, August, and September. It was thus from a very central direction of a rather notable autumnal group of meteor-showers in the neighbourhood of α Piscium, that this bright streak-leaving meteor seems to have proceeded. The corrections above applied to the recorded paths, although apparently considerable, are really only slight shiftings of the flights lengthwise; their original lines of direction, and hence their resulting radiant-point being left, as nearly equally as possible in both the paths, almost unaltered.

Tring.—11.3 P.M.; shot 12°, leaving a streak, from 345 + 58 to 325 + 53 (corrected path, 13°, from 343 + 58 to 322 + 52).

Slough.—11.4 P.M.; 3rd magn.; shot 10°, without streak, from 350 + 72 to 312 + 70 (corrected path, 10°, from 352 + 72 to 317 + 70½).

The path corrections here are only small shortenings or extensions of the apparent tracks to bring their lengths into agreement (at distances apart then of 13° to 18°, in the right directions) without disturbing the path-directions, which diverge from 45 + 53, a point nearly coinciding with the usual radiant-point of the Perseïds on August 10–11, at 44 + 56.

The concluded real path is from 67 miles over a point 5 miles west of Leighton, in Bedfordshire, to 53 miles over a point 3 miles west by north from Tring. The length and downward slope of the real path was 19½ miles, from 45° altitude, 34° north from east. The time of flight of this small Perseïd was not noted at either place of observation, but as it probably agreed with that of several similar short Perseïds noted nearly overhead on the

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